

IN THE CLAIMS

1. (original) A surgical instrument comprising:

an elongated instrument shaft having proximal and distal ends;

a tool disposed from the distal end of the instrument shaft; and

a control handle disposed from the proximal end of the instrument shaft;

said tool being coupled to the distal end of said elongated instrument shaft via a first movable member;

said control handle coupled to the proximal end of said elongated instrument shaft via a second movable member;

whereby movement of said control handle with respect to said elongated instrument shaft via said second movable member causes attendant movement of said tool with respect to said elongated instrument shaft via said first movable member;

wherein at least one of said first and second members comprises a bendable motion member.

2. (original) The surgical instrument of claim 1 further including a control element that intercouple between said first and second movable members so that a movement of the control handle at the second movable member causes a movement of tool via the first movable member.

3. (original) The surgical instrument of claim 2 wherein said control element comprises a cable system that interconnects the first and second movable members, said cable system being actuated by the movement of the control handle to, in turn, move the tool.

4. (original) The surgical instrument of claim 1 wherein each of the movable members have two degree of freedom to provide motion in all directions.

5. (original) The surgical instrument of claim 1 wherein both of the movable members comprise a bendable motion member, each bendable motion member providing at least one degree of freedom and the bending stiffness of the second movable member is greater than the bending stiffness of the first movable member.
6. (original) The surgical instrument of claim 5 wherein each of the bendable motion members have two degree of freedom to provide motion in all directions.
7. (original) The surgical instrument of claim 5 wherein the control handle comprises a push-pull tool actuation arrangement.
8. (original) The surgical instrument of claim 1 wherein the tool movement with respect to the distal end of the elongated shaft is in the opposite direction of the control handle movement with respect to the proximal end of the elongated shaft.
9. (original) The surgical instrument of claim 1 wherein the tool movement with respect to the distal end of the elongated shaft is in the same direction of the control handle movement with respect to the proximal end of the elongated shaft.
10. (original) The surgical instrument of claim 1 wherein the control handle comprises a pull-pull tool actuation arrangement.
11. (original) The surgical instrument of claim 1 wherein the elongated instrument shaft includes at least a flexible segment thereof.
12. (original) The surgical instrument of claim 1 wherein the tool is selected from a group comprising a jaw, gripper, clip applier, stapler, electrosurgery device, scalpel and scissors.
13. (original) The surgical instrument of claim 1 further including another proximal movable member and another distal movable member for multi-modal controlled movement of the tool.

14. (original) The surgical instrument of claim 1 wherein the second movable member is able to axially rotate about the control handle.

15. (original) The surgical instrument of claim 1 further including a distal axial rotation joint for axially rotating the first movable member about the elongated shaft.

16. (original) The surgical instrument of claim 1 further including a distal axial rotation joint for axially rotating the tool about the first movable member.

17. (original) The surgical instrument of claim 1 further including distal and proximal rotation joints wherein the proximal axial rotation joint actuates the distal axial rotation joint.

18. (original) The surgical instrument of claim 1 further including a motion member locking mechanism for releasably locking said movable members.

19. (original) The surgical instrument of claim 1 further including an electromechanical actuator for driving at least one degree of freedom movement of the tool.

20. (original) A surgical instrument comprising:

an elongated instrument shaft having proximal and distal ends;

a tool disposed from the distal end of the instrument shaft; and

a control handle disposed from the proximal end of the instrument shaft;

said tool being coupled to the distal end of said elongated instrument shaft via a movable member;

said control handle coupled to the proximal end of said elongated instrument shaft via a torque sensing member;

an electromechanical actuator coupled to said movable member;

wherein torque applied at said torque sensing member by the operator produces a proportional movement of said actuator, which in turn produces a movement of said tool with respect to said elongated instrument shaft via said movable member.

Please add the following claims to this application:

21. (new) A surgical instrument comprising:

an elongated instrument shaft having proximal and distal ends;

a tool disposed from the distal end of the instrument shaft;

a control handle disposed from the proximal end of the instrument shaft;

a distal bendable member for coupling the distal end of said elongated instrument shaft to said tool;

a proximal bendable member for coupling the proximal end of said elongated instrument shaft to said handle; and

actuation means extending between said distal and proximal bendable members whereby any deflection of said control handle with respect to said elongated instrument shaft causes a corresponding bending of said distal bendable member for control of said tool;

wherein at least one of said bendable members comprise a single unitary slotted structure that is readily capable of bending in any direction.

22. (new) A surgical instrument comprising:

an elongated instrument shaft having proximal and distal ends;

a tool disposed from the distal end of the instrument shaft;

a control handle disposed from the proximal end of the instrument shaft;

a distal motion member for coupling the distal end of said elongated instrument shaft to said tool;

a proximal motion member for coupling the proximal end of said elongated instrument shaft to said handle;

actuation means extending between said distal and proximal motion members for coupling motion of said proximal motion member to said distal motion member for controlling the positioning of said tool; and

a rolling-motion wheel adjacent the control handle and rotatable relative to the control handle for causing a corresponding rotation of the tool about a roll axis.

23. (new) A surgical instrument comprising:

an elongated instrument shaft having proximal and distal ends;

a tool disposed from the distal end of the instrument shaft;

a control handle disposed from the proximal end of the instrument shaft;

a distal bendable member for coupling the distal end of said elongated instrument shaft to said tool;

a proximal bendable member for coupling the proximal end of said elongated instrument shaft to said handle;

actuation means extending between said distal and proximal bendable members for coupling motion of said proximal bendable member to said distal bendable member for controlling the positioning of said tool; and

a rotation member coupled between the control handle and the proximal end of said elongated instrument shaft for enabling rotation of said handle relative to said instrument shaft to lock the handle position relative to the shaft in more than one relative position.

24. (new) A surgical instrument comprising:

an elongated instrument shaft having proximal and distal ends;

a tool disposed from the distal end of the instrument shaft;

a control handle disposed from the proximal end of the instrument shaft;

a distal motion member for coupling the distal end of said elongated instrument shaft to said tool;

a proximal motion member for coupling the proximal end of said elongated instrument shaft to said handle; and

actuation means extending between said distal and proximal motion members for coupling motion of said proximal motion member to said distal motion member for controlling the positioning of said tool;

at least one of said proximal and distal motion members comprising both a bendable section and a pivot section.

25. (new) A surgical instrument comprising:

an elongated instrument shaft having proximal and distal ends;

a tool disposed from the distal end of the instrument shaft;

a control handle disposed from the proximal end of the instrument shaft;

a distal bendable member for coupling the distal end of said elongated instrument shaft to said tool;

a proximal bendable member for coupling the proximal end of said elongated instrument shaft to said handle;

actuation means extending between said distal and proximal bendable members for coupling motion of said proximal bendable member to said distal bendable member for controlling the positioning of said tool;

a distal axial rotation joint at the tool end of the instrument; and

a proximal axial rotation joint;

said distal axial rotation joint responsive to said proximal axial rotation joint so that rotation of said proximal axial rotation joint causes a corresponding rotation of said distal axial rotation joint.

26. (new) A surgical instrument comprising:

an elongated instrument shaft having proximal and distal ends;

a tool disposed from the distal end of the instrument shaft;

a control handle disposed from the proximal end of the instrument shaft;

a distal motion member for coupling the distal end of said elongated instrument shaft to said tool;

a proximal motion member for coupling the proximal end of said elongated instrument shaft with said handle;

an electro-mechanical actuator; and

mechanical cabling extending between said electro-mechanical actuator and said distal motion member for controlling at least the positioning of the tool;

wherein motion applied at said control handle by a user produces a corresponding activation of said actuator, which in turn produces a movement of said tool with respect to said elongated instrument shaft via said distal motion member.

27. (new) A surgical instrument comprising:

an elongated instrument shaft having proximal and distal ends;

a tool disposed from the distal end of the instrument shaft;

a control handle disposed from the proximal end of the instrument shaft;

a distal bendable member for coupling the distal end of said elongated instrument shaft to said tool;

a proximal bendable member for coupling the proximal end of said elongated instrument shaft to said handle; and

actuation means extending between said distal and proximal bendable members for coupling motion of said proximal bendable member to said distal bendable member for controlling the positioning of said tool;

said proximal bendable member having a diameter that is different than the diameter of said distal bendable member.

28. (new) A surgical instrument comprising:

an elongated instrument shaft having proximal and distal ends;

a tool disposed from the distal end of the instrument shaft;

a control handle disposed from the proximal end of the instrument shaft;

a distal motion member for coupling the distal end of said elongated instrument shaft to said tool;

a proximal motion member for coupling the proximal end of said elongated instrument shaft to said handle;

actuation means extending between said distal and proximal motion members for coupling motion of said proximal motion member to said distal motion member for controlling the positioning of said tool; and

a mechanism for locking the relative orientation between the proximal and distal motion members at a predetermined position.

29. (new) A surgical instrument comprising:

an elongated instrument shaft having proximal and distal ends;

a tool disposed from the distal end of the instrument shaft;

a control handle disposed from the proximal end of the instrument shaft;

a distal bendable member for coupling the distal end of said elongated instrument shaft to said tool;

a proximal bendable member for coupling the proximal end of said elongated instrument shaft to said handle; and

actuation means extending between said distal and proximal bendable members for coupling motion of said proximal bendable member to said distal bendable member for controlling the positioning of said tool;

wherein the instrument shaft is flexible for passage intraluminally.

30. (new) A surgical instrument comprising:

an elongated instrument shaft having proximal and distal ends;

a tool disposed from the distal end of the instrument shaft;

a control handle disposed from the proximal end of the instrument shaft;

a distal motion member for coupling the distal end of said elongated instrument shaft to said tool;

a proximal motion member for coupling the proximal end of said elongated instrument shaft to said handle;

actuation means extending between said distal and proximal motion members for coupling motion of said proximal motion member to said distal motion member for controlling the positioning of said tool; and

a capstan and cable arrangement connected between said handle and tool and including a pair of handles for control of a corresponding pair of tool jaws;

wherein said actuation means comprises cabling extending between and off-center of said motion members.

31. (new) A surgical instrument comprising:

an elongated instrument shaft having proximal and distal ends;

a tool disposed from the distal end of the instrument shaft;

a control handle disposed from the proximal end of the instrument shaft;

a distal motion member for coupling the distal end of said elongated instrument shaft to said tool;

a proximal motion member for coupling the proximal end of said elongated instrument shaft to said handle;

actuation means extending between said distal and proximal motion members for coupling motion of said proximal motion member to said distal motion member for controlling the positioning of said tool; and

wherein said proximal motion member comprises a bendable member and said distal motion member comprises a pivotal joint.